

No. 674,880.

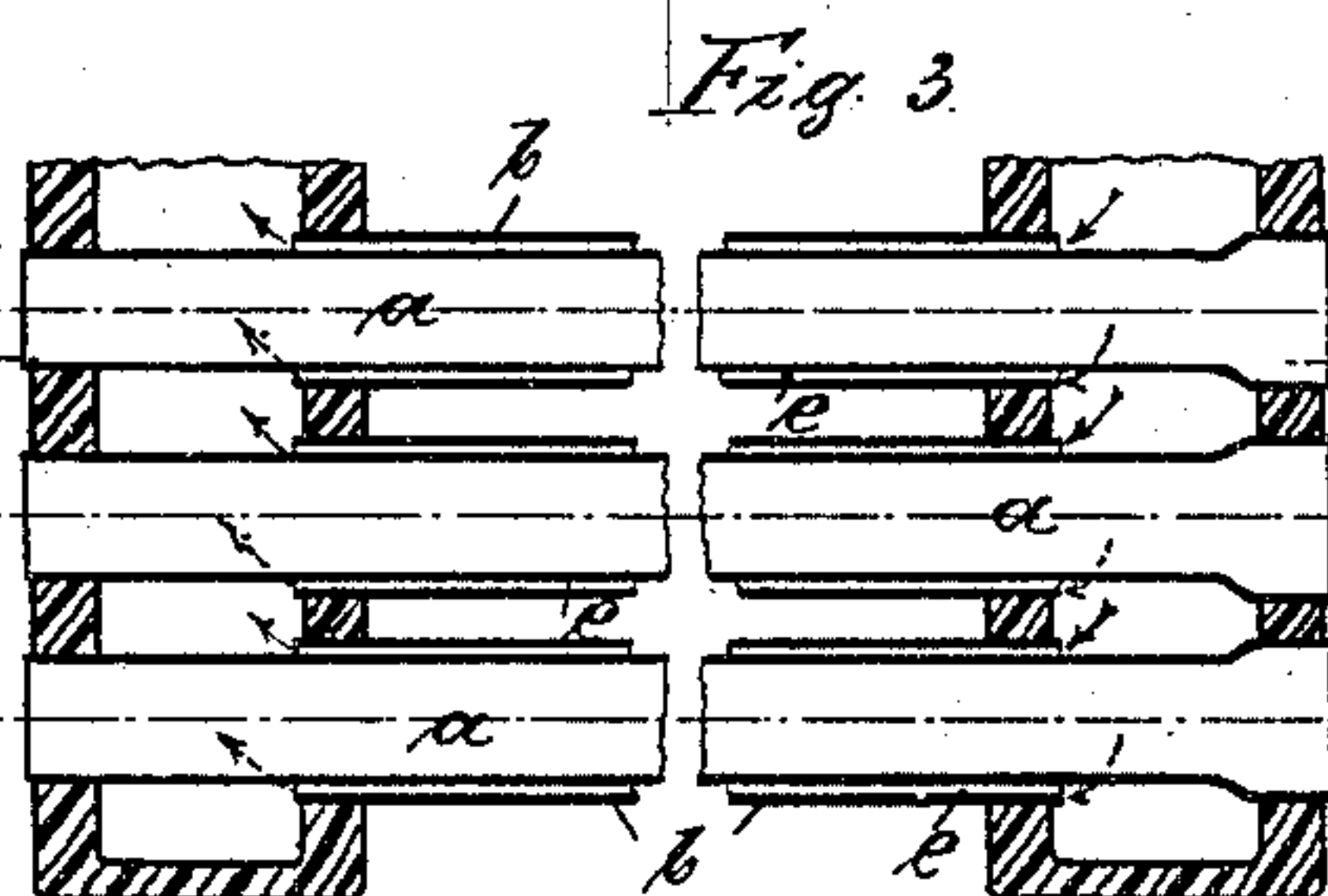
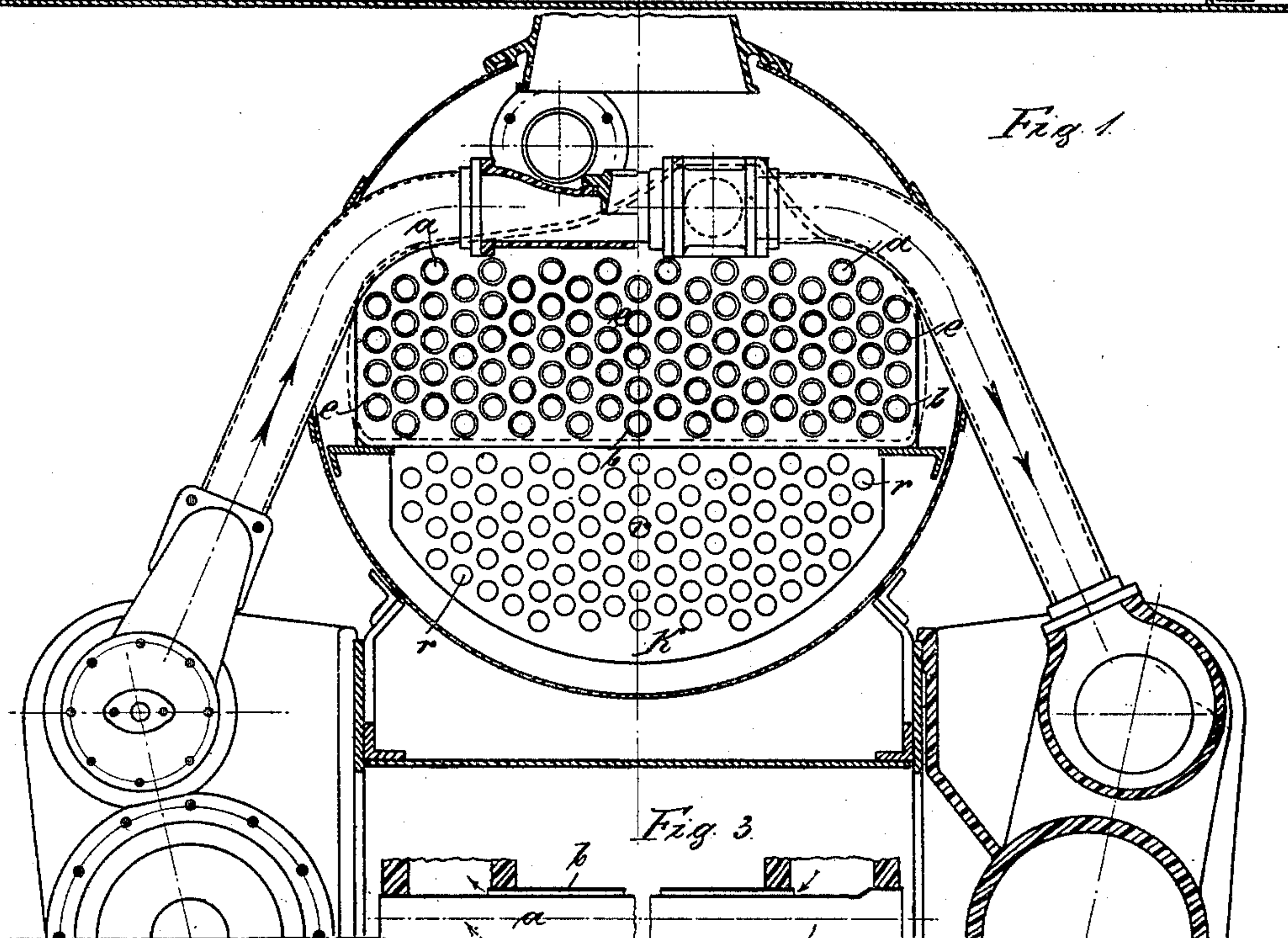
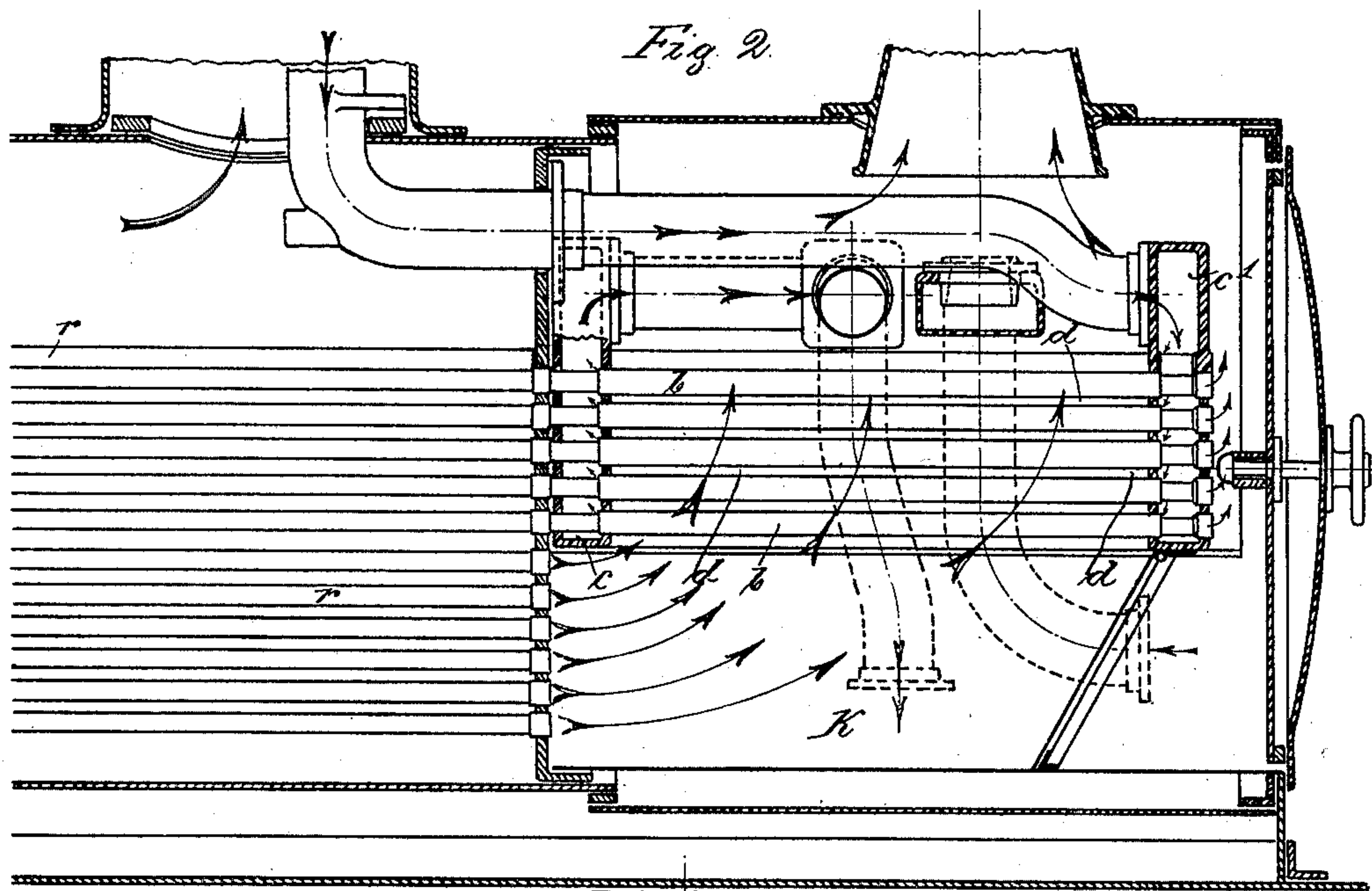
Patented May 28, 1901.

W. SCHMIDT & H. ELSNER.
BOILER.

(Application filed Nov. 27, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
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Emil Kayser.

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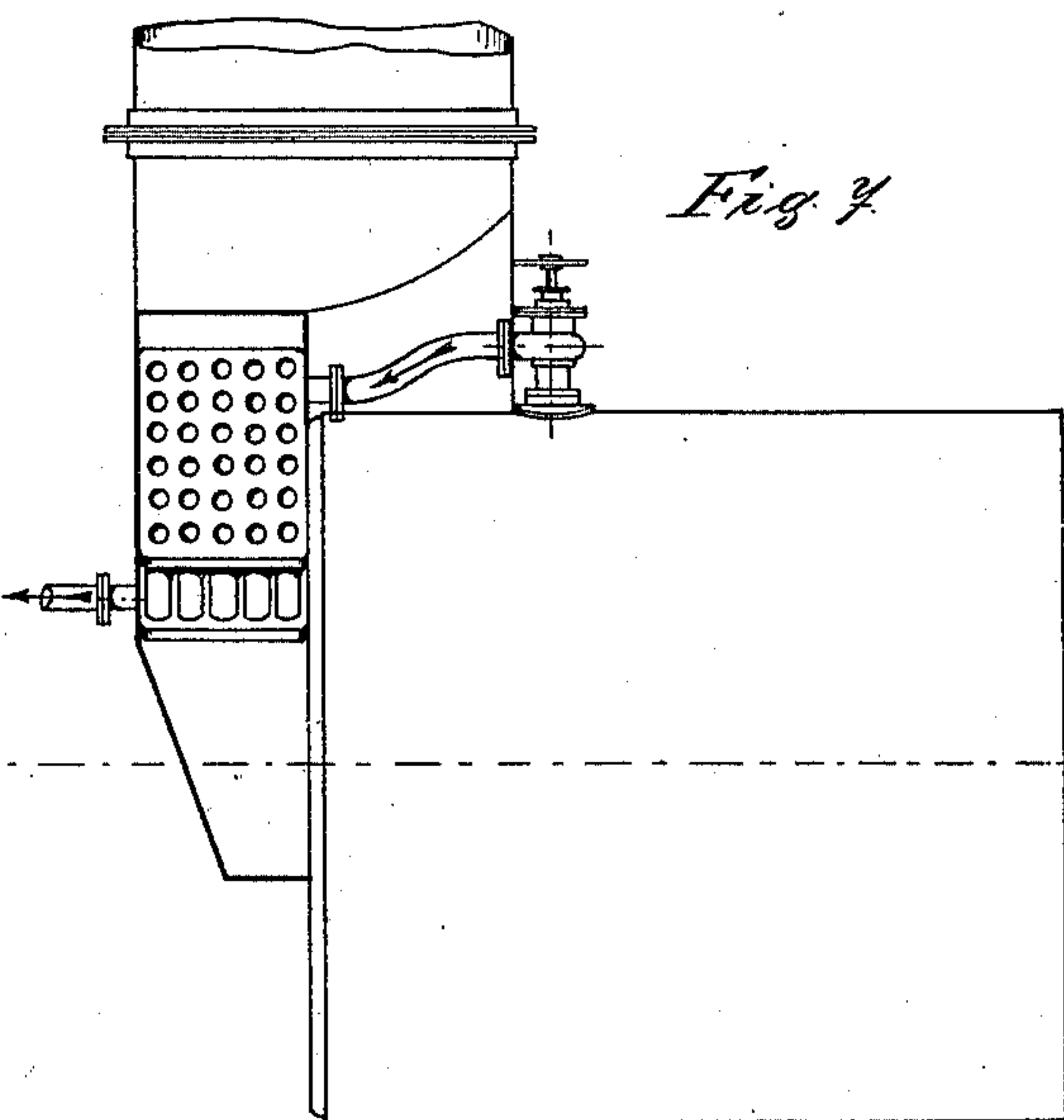
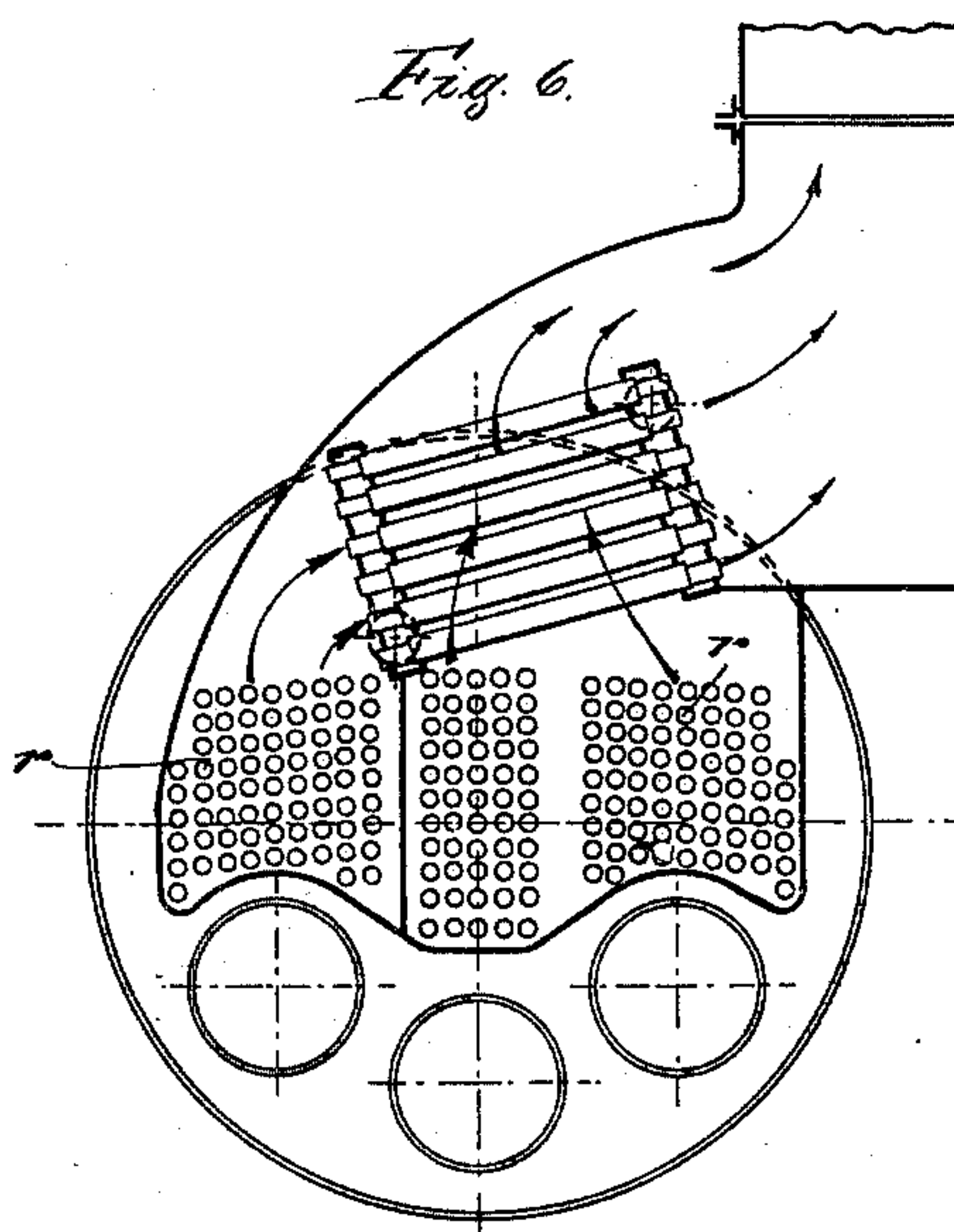
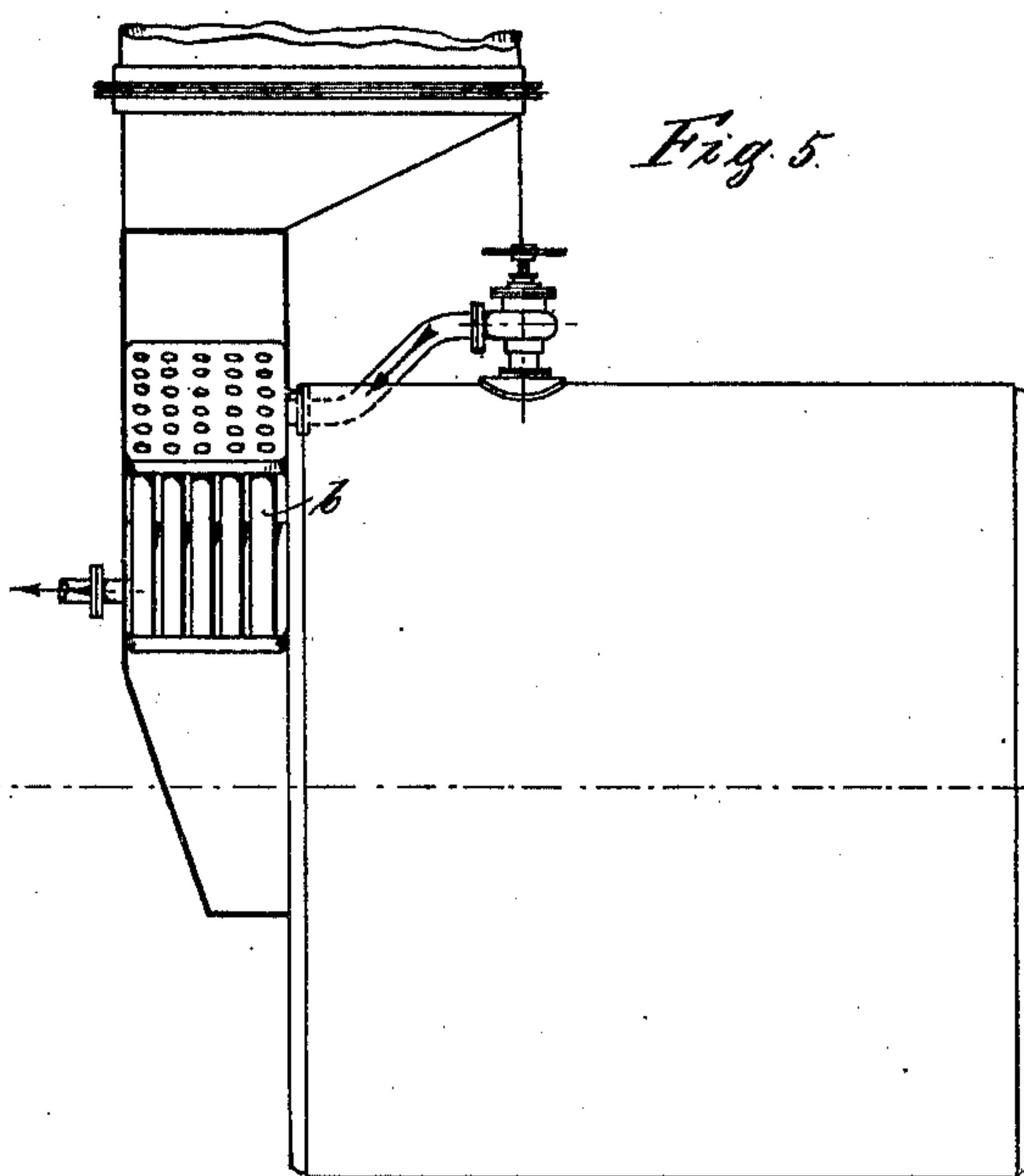
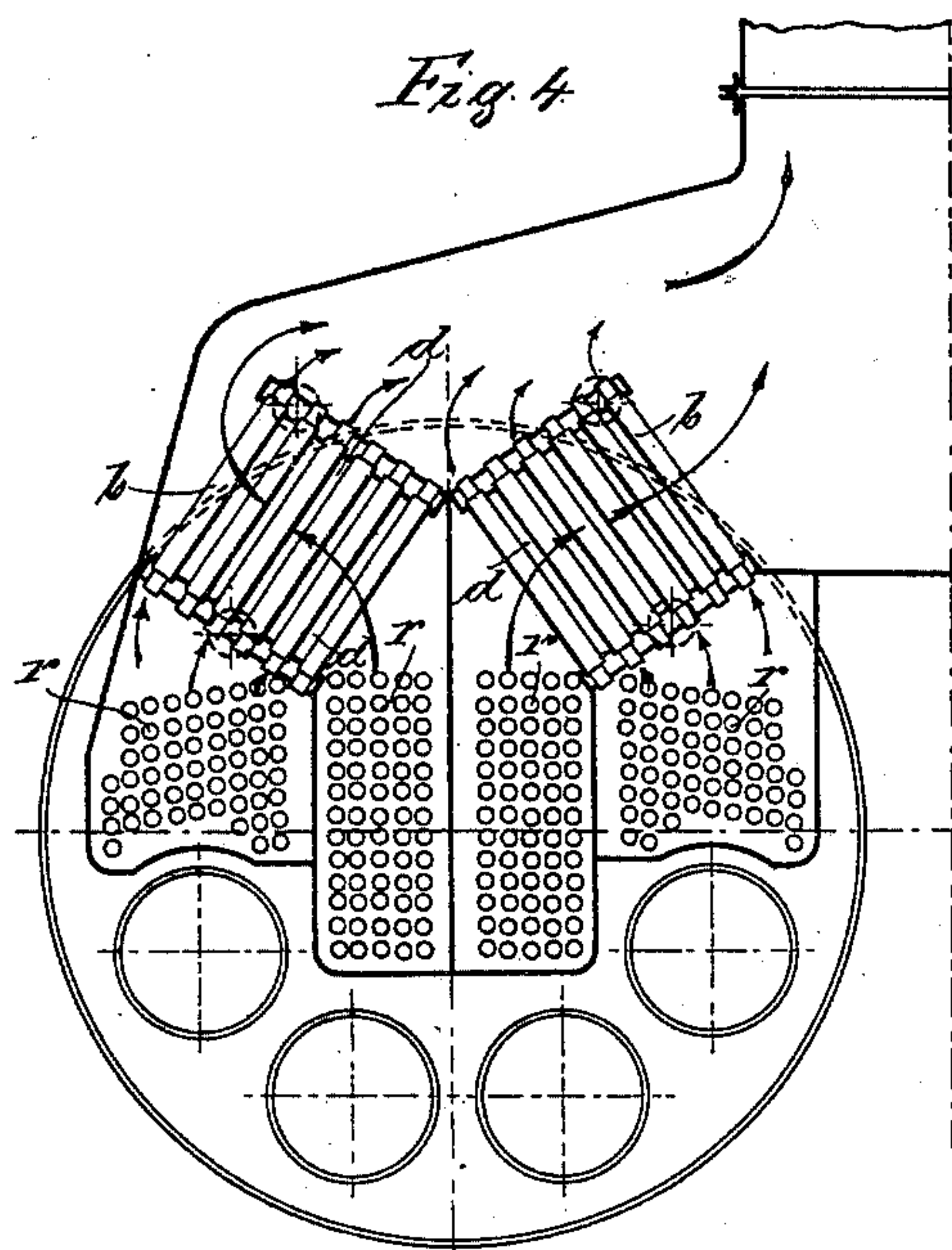
W. SCHMIDT & H. ELSNER.

BOILER.

(Application filed Nov. 27, 1899.)

(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

WILHELM SCHMIDT, OF WILHELMSHÖHE, AND HERMANN ELSNER, OF CASSEL, GERMANY; SAID ELSNER ASSIGNOR TO SAID SCHMIDT.

BOILER.

SPECIFICATION forming part of Letters Patent No. 674,880, dated May 28, 1901.

Application filed November 27, 1899. Serial No. 738,607. (No model.)

To all whom it may concern:

Be it known that we, WILHELM SCHMIDT, a resident of Wilhelmsöhe, near Cassel, and HERMANN ELSNER, a resident of Cassel, in the Province of Hesse-Nassau, German Empire, subjects of the King of Prussia, German Emperor, have invented certain new and useful Improvements in and Connected with Boilers for Locomotives or Similar Tube-Boilers, of which the following is an exact specification.

Hitherto it has been difficult and troublesome to arrange superheaters in boilers for locomotives or similar tube-boilers because it was a difficult problem to ascertain a regular draft and a sufficient heating-surface owing to the small space which only is available for the arrangement of superheaters in such boilers.

The object of the present invention is to obviate the inconveniences found with superheaters employed up to this time for boilers of the above class.

The characteristic feature of our superheater, which is arranged within the smoke-chamber and which, in known manner, consists of double tubes, is the fact that the fire-gases coming from the smoke-pipes simultaneously pass through and around the superheating-pipes without the direction of draft being reversed, whereby a division of the fire-gases takes place. One part of the fire-gases is used for the inner heating, while the other part passes around the superheating-pipes. For this purpose the superheating-pipes are connected to a part of the smoke-pipes only. The fire-gases coming from this part of the smoke-pipes pass through the inner superheating-pipes, and the fire-gases coming from the remaining part of the smoke-pipes directly after leaving these latter meet the outer surface of the superheating-pipes and pass around them, thereby heating them from the outside. With these arrangements several essential advantages, especially for locomotives, can be attained. If the superheating-pipes directly are connected to the smoke-pipes of the boiler, it is evident that the axes of the smoke-pipes and corresponding superheating-pipes are of the same direction, thereby an easy cleansing of the smoke-pipes as well as of the superheating-pipes being

possible. Especially, and this is of importance, with our arrangement it is very easy to have the ashes separated from the gases, the reason thereof being the resistance offered by the pipes. When the ashes meet these pipes, they are separated from the continuous stream and drop down onto the bottom of the smoke-chamber. In the same manner the ashes contained in the stream passing through the superheating-pipes easily are separated.

It is of minor importance to arrange the superheater in the upper part of the smoke-chamber, as we have illustrated it in the accompanying drawings. What we want to have regarded as the chief point of our invention is the division of the fire-gases or, more especially, the employment of one part of them for the inner heating of the superheating-pipes and of the other part for the outer heating of the same.

Our invention will be better understood by reference to the accompanying drawings, in which we have illustrated our improvement used with a locomotive and with a marine boiler, and in which—

Figure 1 illustrates a vertical transverse section through a locomotive, showing the superheating-pipes and their connections. Fig. 2 illustrates a vertical longitudinal section through a locomotive, showing the superheating arrangement, the smoke-pipes, and their connections. Fig. 3 illustrates a detail view of the superheating-pipes. Figs. 4 and 6 illustrate partly plan and partly sectional views of marine boilers provided with our improvement. Figs. 5 and 7 are vertical sections corresponding to Figs. 4 and 6.

The superheater is composed of pipes *a*, surrounded by pipes *b*, both being arranged in series and abutting in known manner into steam-boxes *c c'*. Between the different pipes are formed annular hollow spaces *d*, allowing of the passage of the steam coming from the steam-box *c'* and leading into the steam-box *c*, from there being conducted into the cylinder. Hollow spaces *e* between the double pipes *a b* allow of the passage of the fire-gases. These two steam-boxes *c c'*, with the series of pipes *a b*, connecting both boxes to another, (see Fig. 2,) are arranged within the smoke-chamber of the locomotive.

As clearly to be seen from the drawings, the superheating-pipes *a b* directly are connected with the smoke-pipes *r* of the boiler. The size of the superheating arrangement is such that only a part of the smoke-pipes is necessary, while the other part (in the drawings illustrated as the lower part) remains free. The fire-gases coming from this part of the smoke-pipes directly lead into the smoke-chamber *k*. The inner tubes *a* of the superheater, as illustrated in Fig. 3, form the direct continuation of the smoke-pipes, as can be seen from Fig. 2. Hereby an easy cleansing of the smoke-pipes *r*, as well as of the superheating-pipes *a*, at any moment is rendered possible.

Evidently it is not necessary that the steam-box *c* just comes to lie in front of the pipes *r*; but for the above-named purposes it is advantageous to make use of this position, in which the superheating-pipes and the smoke-pipes are arranged in the same axial direction. The fire-gases coming from the upper part of the tubes *r* pass through the inner superheating-pipes *a* and effect the heating of the same, while the gases coming from the lower part of the smoke-pipes, after having entered the smoke-chamber *k*, pass through the intermediate spaces *e* of the superheater and then into the chamber.

We further beg to point out that the arrangement illustrated, in which the superheater is connected to the upper part of the smoke-pipes merely, is advantageous owing to the smoke-chamber *k* forming a suitable space for taking up the ashes; but we do not confine ourselves to this construction. The ash contained within the fire-gases coming from the lower part of the smoke-pipes immediately will be retained, and also the ash of the gases passing through the inner pipes *a* drop down onto the bottom of the smoke-chambers before they have reached the top of the same.

Our improvement as applied to marine boilers is illustrated in Figs. 4 to 7 of the accompanying drawings. In these drawings, *r* represents the smoke-pipes. Above these smoke-pipes are arranged the superheaters, consisting of superheating-pipes inclined one against another, the inclination in the boiler, as per Figs. 4 and 5, being stronger than that in the boiler illustrated in Figs. 6 and 7. The superheater proper consists of double pipes *a b*, as distinctly described heretofore. In the drawings illustrating elevational views only the outer pipes *b* and the intermediate space *e* are visible. Each superheater has its own smoke-pipes. The smoke-pipes appertaining to each of these superheaters again are separated by

a wall *m* in two parts, similar to the example described for the locomotive-boiler. A part of these smoke-pipes in the drawings, the exterior, leads its fire-gases into the inner superheating-pipes *a*. The other part passes around these pipes, whereby again a thorough superheating is effected. This arrangement, especially for marine boilers, is of the greatest importance, as generally a small space only is available and the draft suffers enormously when the ordinary superheating arrangement is used, the reason of the deficient draft proportions being the fact that the stream after having passed the inner superheating-pipes again is conducted around them, although it is of great advantage to employ a double stream, one of which effects the inner heating and the other the outer heating.

Having thus fully described the nature of our invention, what we desire to secure by Letters Patent of the United States is—

1. In locomotive, marine or similar tube-boilers, a superheating arrangement consisting of double tubes *a b*, the inner tubes *a* conveying a portion of the fire-gases, the outer tubes *b* connecting two steam-boxes *c c'*, annular spaces *e* formed between the outer tubes *b* and the inner tubes *a*, said annular spaces leading the steam to be superheated, intermediate spaces *d* between the outer tubes *b* through which spaces the other portion of the fire-gases are to circulate around the tubes *b* when ascending to the chimney, the whole for the purpose as set forth.

2. In locomotive, marine or similar tube-boilers, a superheating arrangement consisting of double tubes *a b*, of annular spaces *e* between the outer and the inner tubes, intermediate spaces *d* between the different outer tubes *b*, said superheating arrangement being connected to a portion of the boiler-tubes in such a manner that said portion of the boiler-tubes is in direct communication with the inner tubes of the superheater, and the other portion of the boiler-tubes in direct communication with the smoke-box, the whole for the purpose as described.

In witness whereof we have hereunto set our hands in presence of two witnesses.

WILHELM SCHMIDT. [L. S.]
HERMANN ELSNER. [L. S.]

Witnesses as to Wilhelm Schmidt:

GUSTAV KOTHE,
JULIUS FRANKE.

Witnesses as to Hermann Elsner:

CHRISTIAN DUX,
JOSEPH WIEDERHOLD.